

Abstract of the Disclosure

Systems and methods for generating regularized solutions for inverse problems, where the regularization is performed using the Duncan-Horn formulation of a Kalman filter. The various alternative embodiments of the invention are applicable to many different types of inverse problems. In one electrocardiography implementation, electrical potentials are measured within a chamber of the heart and these measurements are processed to generate a mapping of the electrical activity at the interior surface of the heart chamber (these potentials at the heart's surface resulted in the potentials that were measured in the heart chamber). The generation of the mapping of the potentials at the heart's surface is regularized by using a Duncan-Horn formulation of a Kalman filter. The regularization may be based upon multiple steps in time, and the number of time steps may be selectable.